

## Conveyance

Conveyance provides for the movement of water. Specific objectives of natural and managed water conveyance activities include flood management, consumptive and non-consumptive environmental uses, and urban and agricultural water deliveries. Conveyance infrastructure includes natural watercourses as well as constructed facilities like canals, pipelines and related structures, including pumping plants, diversions, distribution systems and fish screens. Groundwater aquifers are also used to convey water. Conveyance ranges from the small local end-user distribution systems to the large watercourses that deliver water to, or drain, areas as large as multiple hydrologic regions.

Some considerations for balancing regional self-sufficiency with imports include:

- Technical feasibility of available regional options,
- Costs (capital, O&M, mitigation, financing, etc),
- Environmental impacts of regional options Vs. import projects
- The type of water management benefits produced (e.g. supply augmentation, water quality improvements, etc).

It is important to note that common water management objectives and option evaluation criteria do not consistently show favor toward either regional or inter-regional options. Determinations must be made at the project-level.

### Current Conveyance in California

Every water project in California uses some type of conveyance to move water from the source to where it is needed. An extensive system of conveyance facilities moves water with the use of its natural and constructed waterways. At the local level, water is distributed from locally developed sources to the end users. Since the state's ecosystem depends on water flow and quality in creeks, streams and rivers, an overall objective is to balance the operation and maintenance of these conveyances to meet the needs of all sectors.

The two largest conveyance projects in California are the State Water Project (SWP) and the Central Valley Project (CVP). Both the SWP and the CVP use natural rivers and constructed conveyances to deliver water from storage reservoirs in northern California to a broad array of agricultural water agencies in northern California and the San Joaquin Valley, as well as urban water agencies in the Sacramento Valley, San Francisco Bay Area, central coast, and urban Southern California.

A number of other inter-regional conveyances have been developed by local agencies. For example, East Bay Municipal Utility District and the San Francisco Public Utilities Commission have developed major conveyance systems that transport water from Sierra Nevada rivers directly to their service areas. The Los Angeles Department of Water and Power developed the Los Angeles Aqueduct to convey water from the Owens Valley to Los Angeles. A major source of water in Southern California continues to be diversion and distribution of Colorado River water via the All American Canal serving the Imperial Irrigation District, the Coachella Canal serving the Coachella Valley and the Colorado River Aqueduct delivering water to urban Southern California. Each of these conveyance systems is a major contributor to each region's water supplies and overall water supply reliability.

The existing networks of inter-regional conveyance systems would not be capable of producing benefits if not for the ability of local water agencies to use conveyance to distribute imported, or locally produced, water to the end users, such as treated drinking water to residential or industrial users or irrigation water to agricultural users. In fact, conveyance is necessary in order for benefits to occur with virtually every other facet of local water management, such as desalination, recycling, use efficiency, storage projects.

Other conveyance activities include environmental and recreation-related conveyance activities that can either be intentional or incidental to agricultural and urban water management activities. This could involve beneficiaries such as fish habitat (temperature, flow or quality improvements), riparian vegetation, rafting or recreational turf.

One current planning process that seeks to enhance conveyance connectivity at the regional level is the CALFED Bay Area Water Quality and Supply Reliability Program. This program is examining conveyance projects as well as other water management tools such as storage, recycling, and desalination in the Bay Area region to improve the area's

drinking water quality and supply reliability. Existing regional, multi-agency conveyance projects in the Bay Area already include the, Hetch Hetchy Aqueduct, South Bay Aqueduct and emergency interconnects between various agencies. The program examines the effectiveness of additional regional conveyance projects that maximize operational efficiency and flexibility<sup>1</sup>. Examples include expansion of

#### **CALFED Conveyance**

Under the CALFED Conveyance Program, the CALFED Record of Decision calls out specific through-Delta conveyance actions that are to be either directly implemented or otherwise pursued including:

- Increase SWP permitted pumping to 8,500 cubic feet per second and install permanent, operable barriers in the south Delta
- Increase SWP permitted pumping to 10,300 cfs and construct Clifton Court Forebay fish screens
- Construct Tracy Fish Test Facility
- Implement Lower San Joaquin River Floodways Improvements and Ecosystem Restoration Project
- Old River and Rock Slough Water Quality Improvement Projects
- Evaluate improved operational procedures for the Delta Cross Channel and simultaneously evaluate a screened through-Delta facility on the Sacramento River up to 4,000 cfs
- Implement North Delta Flood Control and Ecosystem Restoration Improvements Program
- Consider the need for conveyance interties between the SWP and CVP in the vicinity of Delta Mendota Canal Mile Post 7 and between Clifton Court Forebay and the Tracy Pumping Plant
- Continue the Temporary Barriers Project until permanent flow control structures are built
- Evaluate a bypass to the San Felipe Unit at the San Luis Reservoir to reduce risk from the low point water levels in the San Luis Reservoir
- Facilitate water quality exchanges and similar programs to make high quality Sierra Nevada water available to urban Southern California interests
- Assist in implementation of the Sacramento and San Joaquin Comprehensive Study to improve flood control and ecosystem restoration

<sup>1</sup> System flexibility is defined as the ability to adaptively operate, or optimize, multiple water management options by controlling the timing, flow rate, location or quality of available supplies.

the South Bay Aqueduct and additional raw- and treated-water interconnects between adjacent service areas.

Another example of the use of conveyance to provide system flexibility within a region is the Metropolitan Water District of Southern California's network of local conveyance facilities. In addition to numerous locally developed water management options, this region receives water from multiple importation projects – namely the SWP and Colorado River. Both the importation and local options operate with different and often dynamic complexities involving water quality, hydrologic variability, costs, timing, risk levels, geographical distribution and capacities. Therefore, significant water management benefits occur by integrating water operations (using conveyance facilities) to help optimize operations based on the complexities described above.

## **Benefits of Conveyance**

The main benefits of conveyance to the urban, agricultural and environmental water use sectors are in maintaining or increasing water supply reliability, augmenting current water supplies, and providing water system operational flexibility. For the environmental sector, benefits include in-stream flows, appropriate temperatures and water quality for aquatic and riparian habitat. It is important to recognize that improving water supply reliability through system flexibility is just as valuable as increasing overall supply. Indeed, conveyance capacity improvements can enhance reliability without augmenting supplies or reducing demand by increasing system operational flexibility. Other specific benefits are:

- Conveyance is necessary for many of the other resource management strategies. Conveyance is needed to move water in water transfers between sellers and buyers. In order for water to be developed by new groundwater or surface storage, diversion facilities must be capable of filling the storage. Also, facilities must then be in place to convey the storage releases to the users at the right times and flow rates.
- Conveyance improvements can provide the flexibility to divert and move water at times that are less harmful to fisheries.
- Conveyance can improve water quality by moving more water when water quality conditions are better or less impacted by the movement of water.
- Given the high-intensity, short duration characteristics of California's hydrology, improved conveyance capacities can divert more water during high flow/less competitive periods, and consequently reduce the pressure to divert water during low flow/highly competitive periods.
- Other benefits of conveyance improvements generally include:
  - Enhancement of flood control capability
  - Increases in water use efficiency
  - Increases in resiliency to catastrophic events
  - Reductions in operating costs
  - Improvements to instream and riparian habitat

## **Potential Costs of Water Conveyance**

Conveyance costs can be a significant portion of the costs in a water management system. The cost of water conveyance heavily depends on the local circumstances, how far and when the water needs to be conveyed and topography (e.g. pumping Vs gravity flow). For example, it costs less to convey water from Oroville Dam to Yuba City in Northern California, all gravity flow, than to convey water from Oroville Dam to the South Coast Hydrologic Region. Conveying water through the Delta and over the Tehachapi

Mountains increases water costs. CALFED estimates of Delta conveyance improvements may cost about \$1 billion to construct. However, until all alternatives for these facilities are fully evaluated, this cost is tentative. The state's investment in lining All American and Coachella Canals is estimated at \$235 million.

## **Major Issues Facing Conveyance**

The major issues facing conveyance are:

### **Maintenance**

It is essential at a minimum to maintain the current level of conveyance capacity for both natural and constructed facilities. This is likely to take on greater importance over time due to aging water infrastructure, the increasingly higher costs of maintenance, and the increasing demands with increasing population. While concerns are likely to focus on adequate financial resources to maintain conveyance infrastructure, there is the special case of diminishing conveyance capacity in natural watercourses. This is most critical from both a water conveyance and flood passage standpoint in the channels of the Delta.

### **Science**

Water managers, planners and biologists continue to struggle to identify and understand the relationships between hydrodynamics, flow timing, fish timing and movement, water temperature, geomorphology, water quality, environmental responses, global climate change and other conveyance related considerations so they can optimally plan, develop, operate and maintain natural and constructed conveyance infrastructure.

### **Regulatory Compliance**

New conveyance projects may need to address impacts under the application of various laws, regulatory processes and statutes such as Public Trust Doctrine, Area of Origin statutes, CEQA, NEPA, the Clean Water Act and the Endangered Species Acts.

### **Local and Regional Water Supply Reliability**

Greater interconnections are needed to help improve water supply reliability, as evidenced by how California has responded during drought conditions. Each water system has its own level of water supply reliability, based largely on storage and conveyance systems, hydrology, and level of demand. Operational flexibility, particularly during emergency conditions is a primary benefit of greater interconnection of independent water systems include.

### **CALFED Through-Delta Strategy**

The CALFED objective for the Conveyance Program employs a through-Delta approach to conveyance. Delta conveyance capacity and operational restrictions have been identified as key bottlenecks to improving the water supply reliability for in-Delta and water export users. The current lack of flexibility also limits the ability to take advantage of other water management strategies such as water transfers, including transfer of previously stored water, conjunctive management, groundwater storage, and north of Delta water use efficiency. A key challenge for the California Bay-Delta Authority is to implement a strategy that will provide the necessary flexibility to the system and be protective of water quality, Bay-Delta hydrodynamics, fisheries, and habitat.

### Area of Origin Interest

Inter-regional movement of water is sometimes opposed by the source water counties. In addition to struggling to augment local water supplies to meet growing demands, area of origin interests often feel that the downstream water users could or should be more committed to managing the natural infrastructure, such as watersheds, from which their imported water originates.

### Recommendations

The following recommendations apply to state, federal and local water agencies:

1. Consider and implement feasible conveyance system operational changes.
2. Assure adequate resources to maintain existing conveyance facilities and capacity. This may include development of a strategy to maintain channel capacity in areas of the Delta.
3. Promote development of more extensive interconnections among water resources systems such as, and in addition to, the SWP-CVP intertie or improved connectivity within the Bay Area Region. It is likely that leadership and funding on this will be at the local level.
4. Financially support the CALFED through-Delta conveyance improvements per CALFED ROD.
5. Provide finances for lining of AAC & Coachella Canals – to make available 102 taf annually to South Coast Region MDWSC agency.

#### Information Source

- CALFED Record of Decision and Conveyance Program <http://calfed.ca.gov>.